

Low Level Waste Management, Disposal and Shipping at the Savannah River Site

At the Savannah River Site (SRS), the Solid Waste Division (SWD), managed by Westinghouse Savannah River Company for the Department of Energy (DOE), provides for the safe and cost effective treatment, storage and disposal of radioactive (low level and transuranic), hazardous and mixed wastes (radioactive and hazardous combined) generated in processes associated with the past production of nuclear materials.

Low Level Waste

Low level waste (LLW) waste is radioactive waste that is not classified as high-level waste, transuranic waste, spent fuel or by-product material. It usually contains small amounts of short-lived radioactive waste dispersed in large quantities of material. Typical low-level waste consists of used protective clothing, rags, tools and equipment, used resins and residues, dirt, concrete, construction debris and scrap metal. LLW does not contain Resource Conservation and Recovery Act (RCRA)-regulated hazardous waste.

Treatment and Disposal of solid low-level waste

The site's solid low-level wastes include such items as contaminated protective clothing, tools and equipment that have become contaminated with small amounts of radioactive material.

Solid LLW is first sorted, segregated (separated by type and amount of radioactivity), and in some cases volume reduced. It is then packaged and disposed of according to its nature and characterization. Slightly contaminated soil, stabilized ash and rubble can be disposed of in trenches.

Much LLW can be safely treated and disposed of onsite; selection of the appropriate treatment option, waste facility and disposal option is based on the waste characterization and form. LLW is disposed on site using four different options: the Low Activity Waste Vaults (LAWV), the Intermediate Level Vaults (ILV), Engineered Trench #1 or the slit trenches.

In the past, solid low-level waste was disposed of in the Low-Level Radioactive Waste Disposal Facility (LLRWDF, previously called the Low-Level Burial Grounds). The 195-acre LLRWDF no longer accepts waste for disposal. However, the waste already placed in the LLRWDF will remain there, and SRS will continue monitoring the surrounding groundwater to detect radioactivity that may have migrated from the disposal facility.

In October 1994, SRS opened engineered concrete vaults for the permanent disposal of solid low-level waste. At the time, SRS was the first facility in the nation to use these state-of-the-art vaults, which then represented an improved disposal method with significantly better isolation of waste from the environment. These vaults are located in the E-Area Low Level Waste Facility (LLWF).

In addition to vaults, the E-Area LLWF includes use of trenches for disposition of very low activity LLW.

In February 2001, SRS began disposal of low-level waste with extremely low radioactive content in Engineered Trench #1. This “drive-in” trench, located inside E-Area, is designed to extend the useful life of the existing Low Activity Waste Vaults (LAWV) and allow shallow land burial of selected low-level waste. A large percentage of waste (approximately 65 percent), currently stored in the existing LAWV is a candidate for future trench disposal. This approach will enable the more robust LAWVs to be reserved for higher activity low-level waste.

The Engineered Trench measures 200 feet in length by 20 feet in diameter. It is equipped with a concrete sump and pump system (including sample station) to manage anticipated rainfall. The trench is also equipped with a vadose zone monitoring system (VZMS) installed around the perimeter.

With the ET #1 now fully operational, SRS expects to extend the valuable and expensive LAWV space until 2024.

The original Performance Assessment (PA) for the E-Area Low Level Waste Facility was issued in 1994 and revised in 2000. In the original PA, the only use of waste trenches was for soil suspected to be contaminated with radioactive material. Subsequently, use of trenches was expanded to include rubble and wood products. In 2000, a revision of the PA was approved to include disposal of a wide variety of waste types in trenches. The new PA included Homogenous Cement-Stabilized Waste (ashcrete) and Cement-Stabilized Encapsulated Waste (components in grout). Since that time, these kinds of LLW have been disposed of in LLWF trenches.

The Supercompactor Facility (SCF) was constructed in 1999. The SCF, located in the Low Activity Waste Vaults (LAWV), is a mobile unit used to volume reduce compactible low level waste. It is designed to compact 55-gallon drums containing LLW into pucks that are subsequently placed into

reused B-25 containers for disposal in the LAWV. This process allows more efficient and cost effective use of LAWV disposal space. In order to make compaction more cost effective, waste generators are also now packaging compactible waste in drums versus the B-25 containers. Direct disposal waste is shipped offsite in the B-25 containers.

Low-level waste disposal of large equipment (components-in-grout)

During 2001, SRS implemented a new method of disposal for equipment that is physically too large for vault disposal and contaminated at high enough levels to require vault type isolation. The technique, called “components-in-grout,” consists of placing the item on a one-foot thick grout base, filling any void space with special formulation grout, and grouting around the item using the trench walls as a form. This technique allows for the disposal of large legacy equipment that is classified as low-level waste, as well as any newly-generated waste, without having to build new vaults. Currently, this technique is used to dispose of suitable equipment at SRS.

Liquid low-level waste treatment on site

Liquid low-level waste is a by-product of the separations process and tank farm operations. This waste is treated on site by several methods, depending upon its nature.

The Effluent Treatment Facility (ETF) collects and processes low-level radioactive and chemically contaminated wastewater from both the High-Level Waste Tank Farm Evaporator overheads and from reprocessing facility evaporators. Additional waste streams include wastewater from the Consolidated Incineration Facility and well water from environmental remediation processes.

ETF treats liquid low level waste for discharge to a National Pollutant Discharge Elimination System permitted outfall, effectively capturing all chemical and radioactive contaminants except tritium. The state-of-the-art process at ETF includes: pH adjustment, submicron filtration, organic removal, reverse osmosis and ion exchange. ETF replaced the seepage basins that were used until November 1988.

Concentrated liquid waste from the ETF evaporators is further treated at the SRS Saltstone Facility. At this facility, the waste stream undergoes a cement grout immobilization process, after which the waste form is classified as low level waste.

After the waste is received at Saltstone, the liquid salt solution is mixed with cement, fly ash and furnace slag to form a grout. The resulting grout is disposed by pumping it to engineered concrete vaults. Here, it cures into stable concrete (called "saltstone," hence the name of the facility). After filling, the vault is capped with clean concrete to isolate it from rain and weathering. Final closure of the area consists of covering the vaults with a clay cap and backfilling with earth.

Extensive testing shows that any waste constituents leached from the saltstone will remain within Environmental Protection Agency drinking water standards. Wells near the edge of the disposal site are used to monitor groundwater to ensure that it meets standards established by the South Carolina Department of Health and Environmental Control.

Construction of the Saltstone Facility and the first two vaults was completed between February 1986 and July 1988 at a cost of \$45 million. The Saltstone Facility started radioactive operations June 12, 1990. The main process waste stream that Saltstone was designed to process is the high volume, low activity waste stream from the HLW pre-treatment process. The Saltstone facility has been in suspension since 1999 because of the decision to seek an alternative process to prepare high level waste solutions for the Defense Waste Processing Facility (DWPF) and Saltstone. Suspension of the facility reduces costs while minimizing potential deterioration of the plant. This action helps support future operations of the plant and minimize the cost to restart the facility in the future.

Shipment of Low Level Waste to Offsite Facilities

SRS waste management facilities are not suitable for treatment and disposal of all types of low level waste; therefore, commercial vendors and other DOE facility capabilities are being utilized to properly manage the current waste inventory.

SRS is disposing of selected LLW at DOE's Nevada Test Site (NTS) in Nevada. The initial shipment of LLW to NTS took place on July 11, 2001, and shipments continue. LLW types suitable for shipment to the Nevada Test Site include demolition debris from the old Tritium Facility and Spent Resin from groundwater remediation activities.

The demolition debris, which consists of equipment, metal, piping, ductwork, wood, plastic, paper and related material, is shipped in 21 Sealand containers, two Sealands per tractor-trailer. Each container measures 8 ft. X 8 Ft. X 20 ft.

The spent resin from groundwater remediation activities will be shipped in B-12 boxes measuring 45 cubic feet each. Depending on the vehicle, there will be 11-22 boxes per truck. These shipments are anticipated to begin in early 2002 and will continue for at least the next ten years as this waste continues to be produced.

All transportation for these shipments was provided by licensed commercial haulers. SRS notifies the receiving facility (Nevada Test Site) when the shipment is leaving SRS and when to expect arrival. Specific routes are determined by the contracted transporter, and comply with Department of Transportation (DOT) regulations. For all materials transported to the Nevada Test Site, no shipments go over the Hoover Dam or through the city of Las Vegas, NV.

SRS commenced shipments to NTS in fiscal year 2001. This achievement represents the first of a ten-year shipping program to properly dispose of several LLW streams that do not meet disposal criteria at SRS, or are more economical to dispose at the NTS. As a result, a near-term disposal option for these LLW streams is now in place.

Ensuring Safe Shipments and Compliance

All shipments are reviewed and approved by SRS Department of Transportation (DOT) trained personnel to ensure DOT compliance. All waste shipments are transported in strong, tight packages and meet the DOT classification of Low Specific Activity material.

For shipment of LLW to the Nevada Test Site (NTS), SRS met stringent requirements of the NTS Waste Acceptance Criteria. Steps in the NTS Waste Acceptance process included: SRS establishment of a waste certification program to become a certified waste generator to the NTS; an NTS audit establishing SRS as a certified generator for LLW disposal; SRS preparation of a waste profile for each stream identified for disposal; and, NTS review and approval of these waste profiles.

Low level waste shipments such as these are expected to increase over time. SRS' Waste Management 6-year vision for low level waste, hazardous waste and mixed waste is to disposition all legacy waste currently in storage and manage all new waste receipts in a timely fashion.

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